

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re PATENT APPLICATION of

	Pawan Goyal	Art Unit:	2162
Serial No:	10/721,602	Examiner:	C.L. Daye
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For:	HIGH-PERFORMANCE PEER- TO-PEER REMOTE COPY FOR DATABASES	Attorney Ref.:	ARC920030077US1

**SUPPLEMENTAL APPEAL BRIEF**

**MAIL STOP APPEAL BRIEF - PATENTS**

Commissioner For Patents  
P.O. Box 1450  
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Sirs:

This Supplemental Appeal Brief is submitted in connection with the Notice of Appeal submitted February 26, 2009, the final Office Action dated December 8, 2008, and the Notice of Non-Compliant Appeal Brief dated March 18, 2009, in the above-captioned patent application.

**REAL PARTY IN INTEREST**

The real party in interest is International Business Machines Corporation.

**RELATED APPEALS AND INTERFERENCES**

There are no appeals or interferences that are related to the present appeal.

## **STATUS OF CLAIMS**

Claims 1-20, 22-24 and 26 are pending and stand finally rejected in the above-captioned patent application. Claims 21 and 25 have been canceled.

Claims 1-20, 22-24 and 26 are the subject of this appeal.

## **STATUS OF AMENDMENTS**

All amendments made to the claims have been entered. There are no amendments of the claims that have not been entered.

## **SUMMARY OF CLAIMED SUBJECT MATTER**

There are five (5) independent claims that is the subject of this appeal, independent claims 1, 7, 10, 15 and 20. In the following paragraph, the references to the subject matter of independent claims 1, 7, 10, 15 and 20 refer to locations in the originally filed patent application and the originally filed figures.

Independent claim 1 is directed to a method for asynchronously remotely copying database content changes from a primary site (primary site 101, paragraph [14], line 3, and Figure 1) to a remote site (remote site 102, paragraph [14], line 4, and Figure 1). A sequential identification (Lmax counter, paragraph [18], lines 3-4) is associated with each respective log record write and each corresponding data record write received at the primary site (paragraph [18], lines 3-4, and step 203 of Figure 2). Each data record write contains modifications to a page of the database and each log record write contains information describing modifications to the page of the database for a corresponding data record write (paragraph [04], lines 1-2, and paragraph [15]). Each respective log record write is asynchronously remotely copied from the primary site to the remote site (paragraph [18], line 5, and step 204 of Figure 2). An acknowledgement is received at the primary site, such that the acknowledgement corresponds to a log record write that has been completed at the remote site (paragraph [18], line 6-7, and step 205 of Figure 2). Each data record write having a sequential identification that is only prior to or equal to the sequential identification of the log record write corresponding to the received

acknowledgement is asynchronously remotely copied (paragraph [16], lines 6-7, paragraph [19], lines 1-4, and steps 206 and 207 of Figure 2).

Independent claim 7 is directed to a method for asynchronously remotely coping database content changes occurring at a primary site (primary site 101, paragraph [14], line 3, and Figure 1) at a remote site (remote site 102, paragraph [14], line 4, and Figure 1). A log record write is asynchronously received at the remote site (paragraph [20], lines 1-2, and step 302 of Figure 3). Each respective log record received at the remote site has an associated sequential identification (Lmax counter, paragraph [18], lines 3-4) and a corresponding data record write. Each data record write contains modifications to a page of the database and each log record write contains information describing modifications to the page of the database for a corresponding data record write (paragraph [04], lines 1-2, and paragraph [15]). The received log record write is stored at the remote site (paragraph [20], lines 2-3, and step 303 of Figure 3). An acknowledgement is sent from the remote site to the primary site when the received log record write is complete (paragraph [20], lines 3-4, and step 304 of Figure 3). A data record write is asynchronously received at the remote site from the primary site (paragraph [21], lines 2-3, and step 305 of Figure 3). Each received data record write has a sequential identification (Lmax counter, paragraph [18], lines 3-4) that is only prior to or equal to the sequential identification of the log record write corresponding to the received acknowledgement (paragraph [16], lines 6-7). The received data record write is stored (paragraph [21], lines 3-4, and step 306 of Figure 3).

Independent claim 10 is directed to a storage system (storage system 106 and 109, paragraph [14], lines 1-13, and Figure 1) for asynchronously remotely copying content changes stored in the storage system. The storage system comprises a primary site (primary site 101, paragraph [14], line 6-8, and Figure 1) having a storage system (storage system 106, paragraph [14], line 8, and Figure 1) separately storing log records and data records (paragraph [14], line 13.), and a remote site (remote site 102, paragraph [14], line 11, and Figure 1) having a storage system (storage system 109, paragraph [14], lines 11-12, and Figure 1) separately storing log records and a data records (paragraph [14], line 13). The primary site associates a sequential identification (Lmax counter, paragraph [18], lines 3-4) with

each respective log record write and each corresponding data record write occurring at the primary site (paragraph [18], lines 3-4, and step 203 of Figure 2). The primary site asynchronously remotely copies each respective log record write from the primary site to the remote site (paragraph [18], lines 3-4, and step 203 of Figure 2). Each data record write contains modifications to a page of the database and each log record write contains information describing modifications to the page of the database for a corresponding data record write (paragraph [04], lines 1-2, and paragraph [15]). The remote site sends to the primary site an acknowledgement corresponding to a log record write that has been completed at the remote site (paragraph [18], line 6-7, and step 205 of Figure 2). The primary site asynchronously remotely copying to the remote site each data record write having a sequential identification that is only prior to or equal to the sequential identification of the log record write corresponding to the received acknowledgement (paragraph [16], lines 6-7, paragraph [19], lines 1-4, and steps 206 and 207 of Figure 2).

Independent claim 15 is directed to a primary site (primary site 101, paragraph [14], line 6-8, and Figure 1) of a distributed storage system (distributed storage system 100, paragraph [14], lines 1-13, and Figure 1). A storage system separately stores log records and data records (paragraph [14], line 13). Each data record write contains modifications to a page of the database and each log record write contains information describing modifications to the page of the database for a corresponding data record write (paragraph [04], lines 1-2, and paragraph [15]). A controller (controller 107, paragraph [14], line 9, and Figure 1) associates a sequential identification (Lmax counter, paragraph [18], lines 3-4) with each respective log record write and each corresponding data record write occurring at the primary site. Each respective log record write is asynchronously remotely copied from the primary site to a remote site (paragraph [18], line 5, and step 204 of Figure 2). The controller receives an acknowledgement corresponding to a log record write that has been completed at the remote site (paragraph [18], line 6-7, and step 205 of Figure 2). In response, each data record write having a sequential identification that is only prior to or equal to the sequential identification of the log record write corresponding to the received acknowledgement is asynchronously remotely copied

to the remote site (paragraph [16], lines 6-7, paragraph [19], lines 1-4, and steps 206 and 207 of Figure 2).

Independent claim 20 is directed to a remote site (remote site 102, paragraph [14], line 11, and Figure 1) of a distributed storage system (distributed storage system 100, paragraph [14], lines 1-13, and Figure 1). A storage system (storage system 109, paragraph [14], lines 11-12, and Figure 1) separately stores log records and data records (paragraph [14], line 13). Each data record write contains modifications to a page of the database and each log record write contains information describing modifications to the page of the database for a corresponding data record write (paragraph [04], lines 1-2, and paragraph [15]. A controller (controller 110, paragraph [14], line 12, and Figure 1) asynchronously receives a log record write from a primary site (paragraph [20], lines 1-2, and step 302 of Figure 3). Each respective log record received at the remote site has an associated sequential identification (Lmax counter, paragraph [18], lines 3-4) and a corresponding data record write. The received log record write is stored in the storage system (paragraph [20], lines 2-3, and step 303 of Figure 3). An acknowledgement is sent from the remote site to the primary site when the received log record write is complete (paragraph [20], lines 3-4, and step 304 of Figure 3). The controller further asynchronously receives a data record write from the primary site (paragraph [21], lines 2-3, and step 305 of Figure 3). Each received data record write comprises a sequential identification that is only prior to or equal to the sequential identification of the log record write corresponding to the received acknowledgement, and storing the received data record write (paragraph [16], lines 6-7, paragraph [19], lines 1-4, and steps 206 and 207 of Figure 2).

#### **GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

Claims 1, 4-7, 10, 13-15, 18-20, 24 and 26 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Yanai et al. (Yanai), U.S. Patent No. 6,502,205 B1, in view of Kawamura et al. (Kawamura), U.S. Patent Application Publication No. 2004/0193658 A1.

Claims 2, 3, 8, 9, 11, 12, 16, 17, 22 and 23 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Yanai in view of Kawamura and further in view of Shomler, U.S. Patent No. 5,623,599.

## **ARGUMENT**

### **I. The Rejection Based On Yanai In View Of Kawamura**

Applicant respectfully traverses this rejection. Applicant respectfully submits that the subject matter according to any of claims 1, 4-7, 10, 13-15, 18-20, 24 and 26 is patentable over Yanai in view of Kawamura. In particular, Applicant respectfully submits that the Examiner has not presented a convincing line of reasoning as to why an artisan would have found the claimed subject matter of the present patent application to have been obvious in light of the teachings of Yanai and Kawamura because if the combination of Yanai and Kawamura is formed, the resulting device and method are not the claimed subject matter of any of claims 1, 4-7, 10, 13-15, 18-20, 24 and 26.

#### **A. The Examiner has not presented a convincing line of reasoning as to why an artisan would have found the claimed subject matter obvious in light of the teachings of Yanai and Kawamura**

“To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). (See, also, MPEP §§ 706.02(j) and 2144.)

1. At page 3, line 21, through page 3, lines 9-16, of the final Office Action dated December 8, 2008, the Examiner states that, regarding independent claims 1, 7, 10, 15 and 20:

“... Yanai is silent with respect to asynchronously remotely copying each respective log record write from the primary site to the remote site; receiving an acknowledgement at the primary site, the acknowledgement corresponding to a log record write that has been completed at the remote site; and asynchronously remotely copying each data record write having a sequential identification of the log record write corresponding to the received acknowledgement.”

2. In view of the Examiner’s admission that Yanai lacks many of the features of independent claim 1, it follows that the Examiner is not stating that Yanai expressly or impliedly suggests the subject matter of any of claims 1, 7, 10, 15 and 20.

3. Further, the Examiner has not stated that Kawamura expressly or impliedly suggests the subject matter of independent claims 1, 7, 10, 15 and 20.

4. Accordingly, the Examiner must be relying on a combination of Yanai and Kawamura to form the subject matter of claims 1, 4-7, 10, 13-15, 18-20, 24 and 26.

5. Moreover, regarding independent claim 1, the Examiner admits that “Yanai is silent with respect to asynchronously remotely copying each respective log record write from the primary site to the remote site ... .” (See final Office Action dated December 8, 2008, page 3, lines 9-16.)

6. Consequently, if the combination of Yanai in view of Kawamura is to provide these particular aspects of independent claim 1, then Kawamura must disclose or suggest this and other features of claim 1 that Yanai lacks.

7. The Examiner asserts that paragraphs [0016] and [0054], lines 13-18, of Kawamura discloses asynchronously remotely copying each respective log record write from the primary site to the remote site. (See final Office Action dated December 8, 2008, page 3, lines 15-18.)

8. Applicant respectfully submits that the Examiner’s reliance on these two paragraphs of Kawamura as disclosing asynchronously remotely copying each respective log record write from the primary site to the remote site is without basis.

9. Applicant respectfully submits that paragraph [0016] of Kawamura is merely the heading “(b) Log Asynchronous and DB Asynchronous Method” in the Background of the Invention section of Kawamura.

10. In paragraph [0017], Kawamura discloses a system (“conventional” with respect to the Kawamura system) in which the log and DB are transferred asynchronously to a remote site, but suffers from the drawback that the modification contents of the transactions are sometimes lost in the remote site. (See Kawamura, paragraph [0017], lines 6-11.)

11. Further, paragraph [0019] of Kawamura discloses that if the log and DB are transferred to the remote site asynchronously, then the performance degradation in the main site is slight, but there is a problem that modification contents of transactions that have been completed in the main site are sometimes lost in the remote site.

12. Thus, paragraph [0017] of Kawamura in actuality refers to a “conventional” system (“conventional” with respect to Kawamura) in which the log and DB are transferred asynchronously to a remote site, but has the drawback that sometimes the modification contents of the transactions are sometimes lost in the remote site.

13. Plainly, paragraphs [0017] and [0019] of Kawamura teach away from the concept of a log block that is asynchronously transferred to a remote site.<sup>1</sup>

14. The Examiner responds to Applicant’s demonstration that Kawamura teaches away from the concept of a log block that is asynchronously transferred to a remote site by asserting that

“paragraphs [0016]-[0017] are relied upon for merely showing this is a known method of transferring log record writes from a primary site to a remote site asynchronously. Just the mention of there being a slight degradation to the site does not automatically mean that the reference is teaching away from facts, instead the reference is simply stating a possible outcome.” [Underlining added.]

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<sup>1</sup> It is also noted that none of paragraphs [0016]-[0018] of Kawamura disclose or suggest the claimed subject matter of the present patent application.



15. Applicant respectfully submits that the Examiner selectively ignores the actual disclosure of Kawamura in order to make this argument.

16. In particular, lines 8-11 of paragraph [0017] of Kawamura discloses “[a]lthough the performance degradation in the main site is slight, modification contents of transactions that have been completed in the main site are sometimes lost in the remote site.

17. Applicant respectfully submits that it is notable that the Examiner ignores that the “slight degradation” relied on by the Examiner is really a “performance degradation in the main site” that is “slight.” But more telling is that the Examiner completely ignores that Kawamura goes on to disclose that “modification contents of transactions that have been completed in the main site are sometimes lost in the remote site.” Plainly, the portion of Kawamura omitted by the Examiner teaches one of skill in the art away from the concept of a log block that is asynchronously transferred to a remote site.

18. Further, Applicants respectfully submit that the construction of the Examiner’s reasoning, which is based on a critical omission of the Kawamura disclosure, is a tacit admission that the Examiner is ignoring the actual disclosure of Kawamura by the Examiner’s statement that paragraphs [0016]-[0017] of Kawamura “are relied on for merely showing this is a known method”.

19. Applicants respectfully submit that if it is proper for the Examiner to pick and choose certain words and take the selected words out of context to suggest that Applicant has not demonstrated that Kawamura teaches away from the concept of a log block that is asynchronously transferred to a remote site, then it would seem to be proper for the Examiner to pick and choose letters of words throughout the disclosure of Kawamura that are then used to form words that are, in turn, used to form a basis for a rejection. But, it is well known that picking and choosing letters of words from a disclosure to form a basis of a rejection is improper, so why would it be proper for pick and choose words that are then taken out of context to form a basis for a rejection? Applicant respectfully submits that it is well known that such a technique is not proper and does not form a *prima facie* case of obviousness.

20. Moreover, Applicant is aware that the present rejection is based on obviousness, not anticipation. Accordingly, Applicant is demonstrating that the only way that the Examiner can present a line of reasoning that appears to be convincing as to why an artisan would have found the claimed subject matter to have been obvious in light of the teachings of Yanai and Kawamura is to form a line of reasoning that is without basis, that is, unconvincing.

21. Returning to Kawamura and considering paragraph [0054] of Kawamura, the other paragraph relied on by the Examiner as disclosing asynchronously remotely copying each respective log record write from the primary site to the remote site, Applicant respectfully submits that lines 5-18 of paragraph [0054] of Kawamura are:

“If in the case of the present embodiment the received write request is a write request of the log block 262a, then the primary remote copy processing section 212 conducts synchronous write processing of the log block 262 into a secondary disk subsystem 4. If the received write request is a write request of the log block 242a or status information, then the primary remote copy processing section 212 temporarily stores the write request and conducts asynchronous write processing into the secondary disk subsystem 4.” [Underlining added.]

22. Applicant respectfully submits that the first reference to a log block in paragraph [0054] is to a “log block 262a.” The second reference to a log block is to a “log block 242a.”

23. Applicant respectfully submits that the reference to “log block 242a” is a typographical error and, as such, would be properly understood by one skilled in the art to really be a reference to a “DB block 242a.”

24. Support for the conclusion of that “log block 242a” is a typographical error can be found throughout Kawamura. For example, in all cases, except one (i.e., the noted typographic error instance in paragraph [0054] that is at issue), reference indicator “242a” is associated with a DB block. That is, nowhere other than in paragraph [0054] of Kawamura does Kawamura refer to a log block 242a. (See Kawamura, paragraphs [0053], [0062], [0067], [0070], [0075], [0096], [0099], [0110], [0127] and [0128].)

25. Further, in all cases, reference indicator 262a is associated with a log block, not a DB block. (See, Kawamura, paragraphs [0036], [0050], [0053], [0054], [0062], [0067], [0069], [0071]-[0074], [0086], [0089], [0096], [0098] and [0110].) Thus, in only one instance is a log block associated with the reference indicator “242a,” and in no instances is a DB block associated with reference indicator “262a”.

26. Further still, in all instances in which Kawamura refers to a writing process of a log block to a secondary disk subsystem, the writing process is a synchronous writing process, except in paragraphs [0016], [0017] and [0019], [0054, i.e., the typographic error at issue] and [0110]. (See, Kawamura, paragraphs [0036], [0054], [0071], [0072], [0082], [0098], [0106], [0112] and [0124].) The instances in paragraphs [0016], [0017] and [0019] relate to systems that are “conventional” with respect to the Kawamura system and are taught away from by Kawamura. The instance in paragraph [0054] at issue appears to relate to an embodiment of the Kawamura system in which the writing process of a log block is disclosed to be a synchronous writing process, even though there is no other disclosure, complementary or elaborative, by Kawamura.

27. Plainly, this instance is an oddball instance when the disclosure of Kawamura is considered in its entirety, and can be nothing other than a typographical error,

28. Thus, one of skill in the art would properly understand the reference in paragraph [0054] of Kawamura to “log block 242a” to really mean “DB block 242a”.

29. Moreover, Applicant respectfully submits that the Examiner’s assertion that Kawamura discloses asynchronously remotely copying each respective log record write from a primary site to a remote site is without basis because Kawamura teaches away from asynchronously remotely copying each respective log record write from the primary site to the remote site. (See, Kawamura, paragraphs [0016], [0017], [0019], [0110] and [0130].) That is, Kawamura discloses that asynchronously copying log blocks and DB blocks suffers from the drawback that the modification contents of the transactions are sometimes lost in the remote site.

30. In response to Applicant’s demonstration that one of skill in the art would understand the reference in paragraph [0054] of Kawamura to “log block 242a” to really mean

"DB block 242a," the Examiner asserts at page 7, lines 13-15, of the final Office Action dated December 8, 2008, that

"there is nothing that does not show that the reference number beside the phrase "log block" is incorrect and it was actually supposed to indicate item 262a."

31. Applicant respectfully submits that it is notable that the Examiner does not provide any support for the summary dismissal of Applicant's demonstration. Applicant respectfully submits that this rebuttal is consistent with the Examiner's omission of key portions of Kawamura that show the Examiner's conclusions with respect to the disclosure of Kawamura are without basis by ignoring all of the support of Applicant's demonstration that one of skill in the art would properly understand the reference in paragraph [0054] of Kawamura to "log block 242a" to really mean "DB block 242a".

32. Further still, the Examiner uses this lack of support and at page 7, lines 15-21, of the final Office Action dated December 8, 2008, to conclude

"[t]herefore, the examiner fully believes that paragraph [0054] of Kawamura teaches the claimed log record write being written asynchronously from a primary to a remote site. Lastly, Kawamura further teaches that *"it can be determined whether each of the log block, DB block, and status information is written into the secondary disk subsystem synchronously or asynchronously"* (see [0082], lines 1-6). The preceding excerpt clearly discloses that a log block can be written from a primary site to a remote site asynchronously." [Italics provided.]

33. Applicant respectfully submits the portion of paragraph [0054] of Kawamura relied on by the Examiner is half of a sentence that refers to Figure 5 of Kawamura. The initial half of the same sentence that is notably missing from the Examiner argument refers to Figure 4 of Kawamura. Figure 4 of Kawamura depicts a diagram showing configuration information of a DB-disk mapping table 15 in one embodiment of Kawamura. (See Kawamura, paragraph [0078], lines 1-3. Figure 5 of Kawamura depicts a diagram showing an example of a primary/secondary remote copy management table in the same embodiment of Kawamura. (See Kawamura, paragraph [0081], lines 1-3.)

34. Inspection of Figures 4 and 5 of Kawamura plainly reveal that Figure 4 shows that LOG1 and LOG2 are respectively mapped into VOL12-A and VOL22-A in the primary physical device ID, and respectively mapped into VOL12-B and VOL22-B in the secondary physical device ID. Figure 5 plainly shows that the copy mode for VOL12-A and VOL22-A is synchronous.

35. Thus, the conjunction “or” in the half of the sentence relied on by the Examiner is not used by Kawamura disclose that a log block can be written into the secondary disk subsystem synchronously or asynchronously, because Kawamura is really disclosing that on the basis of the information in the DB-disk mapping table of Figure 4 and the information in the primary remote copy management table shown in Figure 5, it can be determined whether each of the log block, DB block and status block information is written into secondary disk subsystem synchronously or asynchronously. Figures 4 and 5 place the context of the words used by Kawamura in the proper context, which is that LOG1 and LOG2 are synchronously copied, not synchronously or asynchronously copied.

36. Applicant respectfully submits that regardless of the Examiner’s belief, the Examiner has not presented a line of reasoning that is convincing as to why an artisan would have found the claimed subject matter to have been obvious in light of the teachings of Yanai and Kawamura. The Examiner’s belief is without basis.

37. Applicants again respectfully submit that if it is proper for the Examiner to pick and choose certain words and take the selected words out of context, then it would seem to be proper for the Examiner to pick and choose letters of words throughout the disclosure of Kawamura that are then used to form words that are, in turn, used to form a basis for a rejection. But, it is well known that picking and choosing letters of words from a disclosure to form a basis of a rejection is improper, so why would it be proper for pick and choose words that are then taken out of context to form a basis for a rejection? Applicant respectfully submits that it is well known that such a technique is not proper and does not form a *prima facie* case of obviousness.

38. It follows that Kawamura does not disclose or suggest a method comprising: asynchronously remotely copying each respective log record write from the primary site to the remote site.

**B. Even if the combination of Yanai and Kawamura is formed, the resulting device and method is not the claimed subject matter.**

1. Thus, if the combination of Yanai and Kawamura is formed, the resulting device and method are not the claimed subject matter of claim 1 because neither Yanai nor Kawamura disclose or suggest a method comprising: asynchronously remotely copying each respective log record write from the primary site to the remote site.

2. Applicant respectfully submits that independent claim 1 is allowable because neither Yanai nor Kawamura disclose or suggest a method comprising: asynchronously remotely copying each respective log record write from the primary site to the remote site.

3. It follows that claims 4-6, which incorporate the features of claim 1, are each allowable over Yanai in view of Kawamura for at least the same reasons that claim 1 is considered allowable.

4. Regarding independent claims 7, 10, 15 and 20, Applicant respectfully submits that each of claims 7, 10, 15 and 20 are allowable over Yanai in view of Kawamura for reasons that are similar to the reasons that claim 1 is considered allowable.

5. It follows that claims 13, 14, 18, 19, 24 and 26, which incorporate the features of their respective base claims, are each allowable over Yanai in view of Kawamura for at least the same reasons that their respective base claims are considered allowable.

**C. It is only by impermissible hindsight that the Examiner can combine Yanai and Kawamura to form the rejection.**

1. Applicant respectfully submit that it is only by impermissible hindsight that the Examiner is able to reject claims 1, 4-7, 10, 13-15, 18-20, 24 and 26 based on Yanai in view of Kawamura.

2. The Examiner does not state that either Yanai or Kawamura expressly or impliedly suggests the claimed subject matter.

3. Moreover, the Examiner has not presented a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of Yanai and Kawamura.

4. Thus, it is only by using Applicants' disclosure as a template that the Examiner is able to select particular features of Yanai and Kawamura through a hindsight reconstruction of Applicant's claims to make the appearance of a proper rejection.

5. Consequently, Applicant respectfully requests that this rejection be withdrawn and claims 1, 4-7, 10, 13-15, 18-20, 24 and 26 be allowed.

## **II. The Rejection Based On Yanai In View Of Kawamura And Further In View Of Shomler**

1. Applicant respectfully traverses this rejection.

2. Applicant respectfully submits that the subject matter according to any of claims 2, 3, 8, 9, 11, 12, 16, 17, 22 and 23 is patentable over Yanai in view of Kawamura and further in view of Shomler because Shomler does not cure the deficiencies of Yanai and Kawamura with respect to claims 1, 7, 10, 15 and 20, the base claims of claims 2, 3, 8, 9, 11, 12, 16, 17, 22 and 23.

3. In particular regarding claim 1, Applicant respectfully submits that Shomler does not disclose or suggest a method comprising at least asynchronously remotely copying each respective log record write from the primary site to the remote site.

4. Consequently, Applicant respectfully requests that this rejection be withdrawn and claims 2, 3, 8, 9, 11, 12, 16, 17, 22 and 23 be allowed.

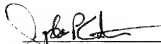
## CONCLUSION

In view of the above arguments, it is urged that the present application is in condition for allowance.

It is requested that this application be passed to issue with claims 1-20, 22-24 and 26.

Respectfully submitted,

Date: March 24, 2009



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## CLAIMS APPENDIX

1. (previously presented) A method for asynchronously remotely copying database content changes from a primary site to a remote site, the method comprising:

associating a sequential identification with each respective log record write and each corresponding data record write received at the primary site, each data record write containing modifications to a page of the database and each log record write containing information describing modifications to the page of the database for a corresponding data record write;

asynchronously remotely copying each respective log record write from the primary site to the remote site;

receiving an acknowledgement at the primary site, the acknowledgement corresponding to a log record write that has been completed at the remote site; and

asynchronously remotely copying each data record write having a sequential identification that is only prior to or equal to the sequential identification of the log record write corresponding to the received acknowledgement.

2. (original) The method according to claim 1, wherein the sequential identification is a monotonically increasing identification number.

3. (original) The method according to claim 1, wherein the sequential identification is a monotonically increasing time-stamp identification.

4. (original) The method according to claim 1, wherein a log record write is asynchronously remotely copied from the primary site to the remote site before a data record write is asynchronously remotely copied from the primary site to the remote site.

5. (original) The method according to claim 1, wherein each log record write is a log block and each data record write is a data block write.

6. (original) The method according to claim 1, further comprising:  
asynchronously receiving a log record write at the remote site;  
storing the received log record write at the remote site;  
sending an acknowledgement from the remote site to the primary site when the received log record write is complete;  
asynchronously receiving a data record write at the remote site from the primary site; and  
storing the received data record write.

7. (previously presented) A method for asynchronously remotely coping database content changes occurring at a primary site at a remote site, the method comprising:  
asynchronously receiving a log record write at the remote site, each respective log record received at the remote site having an associated sequential identification and a corresponding data record write, each data record write containing modifications to a page of the database and each log record write containing information describing modifications to the page of the database for a corresponding data record write;  
storing the received log record write at the remote site;  
sending an acknowledgement from the remote site to the primary site when the received log record write is complete;  
asynchronously receiving a data record write at the remote site from the primary site, each received data record write having a sequential identification that is only prior to or equal to the sequential identification of the log record write corresponding to the received acknowledgement; and  
storing the received data record write.

8. (original) The method according to claim 7, wherein the sequential identification is a monotonically increasing identification number.

9. (original) The method according to claim 7, wherein the sequential identification is a monotonically increasing time-stamp identification.

10. (previously presented) A storage system for asynchronously remotely copying content changes stored in the storage system, the system comprising:

a primary site having a storage system separately storing log records and data records;

a remote site having a storage system separately storing log records and a data records,

the primary site associating a sequential identification with each respective log record write and each corresponding data record write occurring at the primary site and asynchronously remotely copying each respective log record write from the primary site to the remote site, each data record write containing modifications to a page of the database and each log record write containing information describing modifications to the page of the database for a corresponding data record write, the remote site sending to the primary site an acknowledgement corresponding to a log record write that has been completed at the remote site, and the primary site asynchronously remotely copying to the remote site each data record write having a sequential identification that is only prior to or equal to the sequential identification of the log record write corresponding to the received acknowledgement.

11. (original) The system according to claim 10, wherein the sequential identification is a monotonically increasing identification number.

12. (original) The system according to claim 10, wherein the sequential identification is a monotonically increasing time-stamp identification.

13. (original) The system according to claim 10, wherein a log record write is

asynchronously remotely copied from the primary site to the remote site before a data record write is asynchronously remotely copied from the primary site to the remote site.

14. (original) The method according to claim 10, wherein each log record write is a log block and each data record write is a data block write.

15. (previously presented) A primary site of a distributed storage system, the system comprising:

a storage system separately storing log records and data records, each data record write containing modifications to a page of the database and each log record write containing information describing modifications to the page of the database for a corresponding data record write; and

a controller associating a sequential identification with each respective log record write and each corresponding data record write occurring at the primary site and asynchronously remotely copying each respective log record write from the primary site to a remote site, the controller receiving an acknowledgement corresponding to a log record write that has been completed at the remote site and, in response, asynchronously remotely copying to the remote site each data record write having a sequential identification that is only prior to or equal to the sequential identification of the log record write corresponding to the received acknowledgement.

16. (original) The system according to claim 15, wherein the sequential identification is a monotonically increasing identification number.

17. (original) The system according to claim 15, wherein the sequential identification is a monotonically increasing time-stamp identification.

18. (original) The system according to claim 15, wherein a log record write is asynchronously remotely copied from the primary site to the remote site before a data record

write is asynchronously remotely copied from the primary site to the remote site.

19. (original) The method according to claim 15, wherein each log record write is a log block and each data record write is a data block write.

20. (previously presented) A remote site of a distributed storage system, the system comprising:

a storage system separately storing log records and data records, each data record write containing modifications to a page of the database and each log record write containing information describing modifications to the page of the database for a corresponding data record write,

a controller asynchronously receiving a log record write from a primary site, each respective log record received at the remote site having an associated sequential identification and a corresponding data record write, storing the received log record write in the storage system and sending an acknowledgement from the remote site to the primary site when the received log record write is complete, the controller further asynchronously receiving a data record write from the primary site, each received data record write comprising a sequential identification that is only prior to or equal to the sequential identification of the log record write corresponding to the received acknowledgement, and storing the received data record write.

21. (canceled)

22. (original) The remote site according to claim 20, wherein the sequential identification is a monotonically increasing identification number.

23. (original) The remote site according to claim 20, wherein the sequential identification is a monotonically increasing time-stamp identification.

24. (original) The remote site according to claim 20, wherein a log record write is asynchronously remotely copied from the primary site to the remote site before a data record write is asynchronously remotely copied from the primary site to the remote site.

25. (canceled)

26. (original) The remote site according to claim 20, wherein each log record write is a log block and each data record write is a data block write.

## **EVIDENCE APPENDIX**

No Additional Evidence Submitted

## **RELATED PROCEEDINGS APPENDIX**

No related proceedings